

CHEMICAL MARKERS IN EARLY CANCER DETECTION

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For several years we have been developing the technique of gas chromatography-mass spectrometry (GC/MS) under computer management for the identification of the metabolites present in body fluids. Our analytical procedure involves chemical fractionation into solvent extractables (acids, phenols, neutrals); bases (amines, amino acids) and carbohydrates. Each fraction must be derivatized to increase its volatility for GC/MS analysis.

The point of departure in our applying GC/MS to the identification of metabolites present in physiological fluids was a study of the urinary profiles of normal infants and those afflicted with late metabolic acidosis. Following this investigation, we commenced analyzing body fluids from patients with clinical symptoms suggestive of genetic disease.

Concurrent with this last objective we commenced a study directed at the recognition of urinary metabolites from children suffering from various leukemias. During this research we observed the frequent urinary excretion (milligrams to one gram per day) of beta-aminoisobutyric acid (BAIB). Out of a total of 20 children 12 were found to excrete BAIB, the concentration of which dropped appreciably as the patient continued drug therapy.

We observed that the gas chromatographic peak corresponding to BAIB was often contaminated making its quantitation inaccurate by this method. This observation led us to develop a specific and sensitive method for the measurement of BAIB levels in biological fluids. The procedure relies on the technique of mass fragmentography in which the mass spectrometer is used as a specific ion detector for the gas chromatograph. The urinary amine fraction is derivatized and the mass spectrometer directed to sample only two ions known to be characteristic for derivatized BAIB and the internal standard. Quantitation is achieved knowing the relative ionization efficiencies of BAIB and the internal standard.

Our attack on the problem of early cancer detection will involve the screening of urine samples for chemical markers idiosyncratic for cancers of the urinary tract. We also intend to quantitate levels of BAIB and protein amino acids for the same patients and controls.

* any idea?
[Contaminated with what?]